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EXAMINER

LUGO, DAVID B

ART UNIT PAPER NUMBER

2637

DATE MAILED: 04/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/023,115	Applicant(s) BECKER ET AL.	
	Examiner David B. Lugo	Art Unit 2637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because of undue length. The abstract should be limited to a single paragraph within the range of 50 to 150 words. See MPEP § 608.01(b).
2. U.S. Patent No. 6,671,338 corresponding to U.S. Application 09/436,670 should be included in the first paragraph of page 1.
3. The disclosure is objected to because of the following informalities:
 - a. In the Brief Description of the Drawings, the descriptions of Figures 2 and 3 do not correspond with the Figures. It appears the description of Figure 2 actually depicts what is shown in Figure 3, the description of Figure 3 does not correspond with any of the figures, and Figure 2 is not described in the Brief Description.
 - b. Page 20, line 6 of paragraph 38, “equalizers 144a, 144b” should be --equalizers 140a, 140b-- to correspond with Figure 6.

Appropriate correction is required.

Claim Objections

4. Claims 3, 5, 9, 13, 14 and 17-28 are objected to because of the following informalities:
 - a. Claim 3 recites that “said equalizers are in parallel with said at lest one demodulator”. However, base claim 2 recites that the equalizers equalize the estimation signals from the demodulator. It is unclear how the equalizer can receive signals from the demodulator while being “in parallel” with the same demodulator. The drawings do not show any configuration where the demodulator is in parallel with the equalizer that would clarify this limitation.

- b. Claim 5, line 1, "said signal parameter" should be --said parameter--.
 - c. Claim 9 recites the limitation "said relatively more accurate estimated data signal" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.
 - d. Claim 13, line 1, the phrase "in another embodiment" should be deleted.
 - e. Claim 14, line 1, the phrase "in another embodiment" should be deleted.
 - f. Claim 17, lines 5-6, "output channel information" should be --outputting channel information--.
 - g. Claim 17, line 16, it is unclear which signals are being referred to by "said signals" as multiple signals (i.e. data, interference, output) have been previously recited in the claim.
 - h. Claim 24 recites the limitation "said relatively more accurate estimated data signal" in lines 2-3. There is insufficient antecedent basis for this limitation in the claim. It is suggested that the term --relatively-- be added before the limitation "more accurate data signal" recited in claim 17, lines 16-17 to provide proper antecedent basis for the limitation of claim 24.
 - i. Claim 28, line 1, "said signal parameter" should be --said parameter--.
- Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 5-9, 15-17, 21-23 and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Fuller et al. U.S. Patent Application Publication 2003/0095590.
7. Regarding claim 1, Fuller et al. disclose a system comprising a receiver (Fig. 1) for receiving a waveform, a filter bank 40 (Fig. 1) for filtering the waveform and outputting information including a combination of data signals and interference, a demodulator 68 (see Fig. 2 which illustrates functions of the baseband processor 30 of Fig. 1; page 2, para. 25), the demodulator considered to output an estimation signal representative of at least one parameter of the channel information, a decoder 70 (Fig. 2) for calculating an estimated interference value based on the estimation signal, and an interference canceller 66 (Fig. 2) for estimating a data signal substantially without interference based on the channel information and the interference value output from the decoder 70 via processing circuit 72 and regeneration circuit 74.
8. Regarding claim 5, Fuller et al. disclose that the signal parameter output from the demodulator is a complex output (page 3, para. 29), considered to comprise at least phase information.
9. Regarding claims 6-8, the channels may be considered to comprise carrier groups, which may be grouped into groups having odd and even channels.
10. Regarding claim 9, Fuller et al. disclose that the interference canceller 66 subtracts the regenerated signals from the composite input signal for a number of iterations (page 3, para. 28).
11. Regarding claims 15 and 16, Fuller et al. further disclose that the weighting function may be based upon a soft decision or a hard decision provided by the decoder (page 4, para. 42).

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12. Regarding claim 17, Fuller et al. disclose a system for receiving a waveform (Fig. 1), using a filter 40 for filtering the waveform and outputting information including a combination of data signals and interference, estimating an output signal representative of at least one parameter of the channel information via a demodulator 68 (see Fig. 2 which illustrates functions of the baseband processor 30 of Fig. 1; page 2, para. 25), calculating an estimated interference value based on the estimation signal via decoder 70 (Fig. 2), and estimating a data signal without interference based on the channel information and the interference value output from the decoder 70 via processing circuit 72 and regeneration circuit 74.
13. Regarding claims 21-23, the channels may be considered to comprise carrier groups, which may be grouped into groups having odd and even channels.
14. Regarding claim 28, Fuller et al. disclose that the signal parameter output from the demodulator is a complex output (page 3, para. 29), considered to comprise at least phase information.

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 2, 4 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al. in view of Zehavi U.S. Patent 6,496,543.
17. Regarding claims 2 and 27, Fuller et al. disclose a receiver as described above, but do not expressly disclose an equalizer adapted to equalize the signals from the demodulator.

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18. Zehavi discloses a digital receiver in Fig. 6 where an equalizer 205 equalizes signals output from a demodulator 204.

19. It would have been obvious to one of ordinary skill in the art to equalize signals output from the demodulator, as taught by Zehavi in the system of Fuller et al. in order to compensate for effects of the propagation environment (see Zehavi, col. 7, lines 56-58).

20. Regarding claim 4, the equalizer of Zehavi is shown to be in serial with the demodulator.

21. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al. in view of Jayaraman et al. U.S. Patent Application Publication 2003/0087622.

22. Regarding claims 2 and 3, Fuller et al. disclose a receiver comprising a rake demodulator as described above, but do not expressly disclose an equalizer in parallel with the demodulator.

23. Jayaraman et al. disclose a system for mitigating adjacent channel interference where an equalizer 420 is shown to be in parallel with a rake demodulator 430 as shown in Fig. 4 (page 5, para. 71).

24. It would have been obvious to one of ordinary skill in the art to combining the teaching of Jayaraman et al. of providing an equalizer in parallel with the demodulator of Fuller et al. in order to select the most appropriate signal for decoding (see page 5, para. 71-74).

25. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al. in view of Huang et al. U.S. Patent 6,301,293.

26. Regarding claim 10, Fuller et al. disclose a receiver using interference cancellation as described, but do not disclose that the interference canceller is based on the MMSE criterion.

27. Huang et al. disclose interference cancellation using the MMSE criterion (col. 11, line 65 to col. 12, line 1).

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28. It would have been obvious to one of ordinary skill in the art to use an MMSE criterion in the interference canceller of Fuller et al. because it allows for relatively simple adaptive implementation (see Huang et al., col. 2, lines 17-19).

29. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al. in view of Okamoto U.S. Patent 5,692,018.

30. Regarding claim 11, Fuller et al. disclose a receiver using interference cancellation as described above, but do not disclose that the interference canceller is equipped with feed-back coefficients and feed-forward coefficients.

31. Okamoto discloses an interference canceller 11 comprising feed-forward and feedback coefficients for suppressing interference (col. 4, line 63 to col. 5, line 34).

32. It would have been obvious to one of ordinary skill in the art to utilize the interference canceller of Okamoto in the system of Moher as it allows for minimizing decision error and results in more accurate data reception.

33. Regarding claim 12, Okamoto further discloses that both the feed-forward and the feedback coefficients are continuously updated (col. 5, lines 31-34).

34. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al. in view of Okamoto as applied to claim 11 above, and further in view of Takatz et al. U.S. Patent Application Publication 2002/0163979.

35. Regarding claim 13, Fuller et al. in combination with Okamoto disclose a receiver having filter coefficients as disclosed above, but do not expressly disclose that certain coefficients are fixed to reduce complexity.

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36. However, it is well known in the art of digital filtering to keep filter coefficients fixed for reduced complexity. Takatz et al. disclose reducing system complexity by maintaining fixed filter coefficients (page 1, para. 8).

37. It would have been obvious to one of ordinary skill in the art to keep certain filter coefficients fixed in the system of Fuller et al. and Okamoto in order to reduce system complexity.

38. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al. in view of Moher U.S. Patent 6,161,209.

39. Regarding claim 14, Fuller et al. disclose a receiver comprising an interference canceller as disclosed above, but do not expressly disclose that the interference canceller is designed using the maximum-a-posteriori (MAP) rule.

40. Moher discloses the use of decoders using the MAP rule along with interference cancellation (col. 12, lines 10-17).

41. It would have been obvious to one of ordinary skill in the art to implement the system of Fuller et al. according to the MAP rule because it provides increasingly improved estimates (see Moher, col. 14, lines 60-62).

42. Claims 18, 20 and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al. in view of Kim et al. U.S. Patent 6,697,443.

43. Regarding claim 18, Fuller et al. disclose a receiver comprising an interference canceller as disclosed above, but do not expressly disclose that the decoders are soft-input/ soft-output decoders.

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44. Kim et al. disclose the use of soft-input/ soft-output decoding methods in order to improve decoding performance (see col. 1, lines 35-43).

45. It would have been obvious to one of ordinary skill in the art to use soft-input/ soft-output decoders in the system of Fuller et al. in order to improve decoding performance.

46. Regarding claim 20, Kim et al. further disclose the soft-input /soft-output decoders may include a MAP decoding algorithm or a SOVA algorithm (col. 1, lines 39-50).

47. Regarding claim 24-26, Fuller et al. disclose that the interference canceller 66 subtracts the regenerated signals from the composite input signal for a number of iterations, where the signals are more accurate signals are repeatedly fed back to the interference canceller to output increasingly more accurate data signals (page 3, para. 28).

48. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al. in view of Blaker et al. U.S. Patent 5,748,650.

49. Regarding claim 18, Fuller et al. disclose a receiver comprising an interference canceller as disclosed above, but do not expressly disclose that the decoders are soft-input/ hard-output decoders.

50. Soft-input/ hard-output decoders are well known in the art. For instance, Blaker et al. disclose that a decoder may provide either a hard output or a soft output (col. 3, lines 57-58).

51. It would have been obvious to one of ordinary skill in the art to use soft-input/ hard-output decoder in the system of Fuller et al. as a matter of design choice.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David B. Lugo whose telephone number is 571-272-3043. The examiner can normally be reached on M-F; 9:30-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David B. Lugo
4/13/05


KHAI TRAN
PRIMARY EXAMINER